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POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

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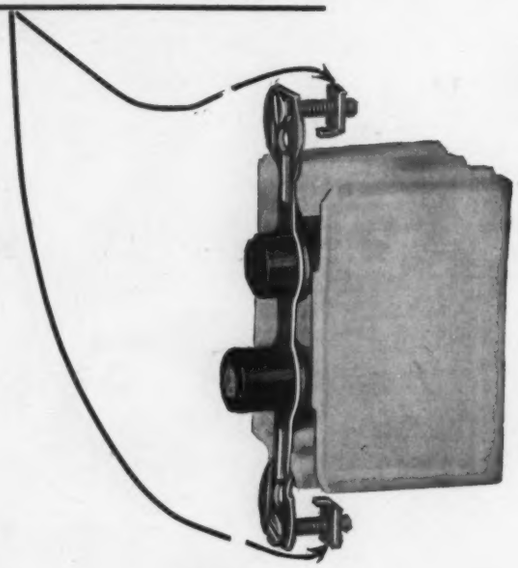
Alphabetical Index to Advertisers, Page 8. **Where to Buy It in the West, Pages, 9, 10.**

THESE ARE THE VANTAGE POINTS



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The adjusting nuts with which all G-E switches are provided, eliminates the nuisance, loss of time and labor entailed by the old method of using washers to flush the box with the wall.

This is only one of many dependable wiring devices carried by us and designed to give high efficiency and economy not only during installation but in every day service.

Write and have us demonstrate their installation to you.

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The Modern Electrical Supply House

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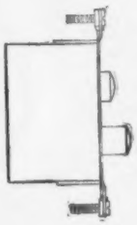
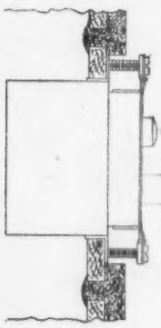
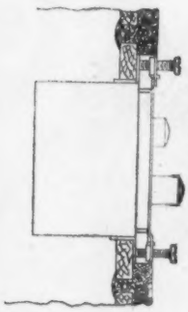


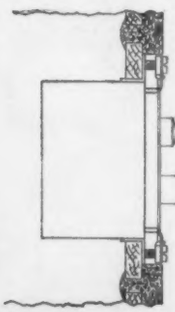
FIRST—Place the screws in the inside holes in the switch support and run the nuts on until they clamp the support. The lugs on the nuts to be in the inside holes in the support.



SECOND—Place the switch in the outlet box with the points of the screws in the threaded holes in the outlet box ears.



THIRD—Back out the screws, at the same time pressing inward on the switch, until the switch supports are flush with the surface of the plaster.



FOURTH—Turn the screws forward so they will enter the threaded holes in the outlet box, and tighten up.

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POWER AND GAS
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AN ELECTRIFIED APARTMENT HOUSE

BY GEO. R. PIMLOTT.

Piedmont Court, Santa Cruz, Cal.

"Piedmont Court" is an apartment house recently constructed at Santa Cruz, California, which is remarkable for the complete manner in which it has been electrically equipped. It is believed that in no similar building have such elaborate preparations been made to do everything electrically and as such it should interest the readers of this journal. The owner, Mr. Pedro B. Chisem, gave the electric engineer free rein in planning electrical conveniences because of his wide experience in the advantage to be derived from electrical operation.

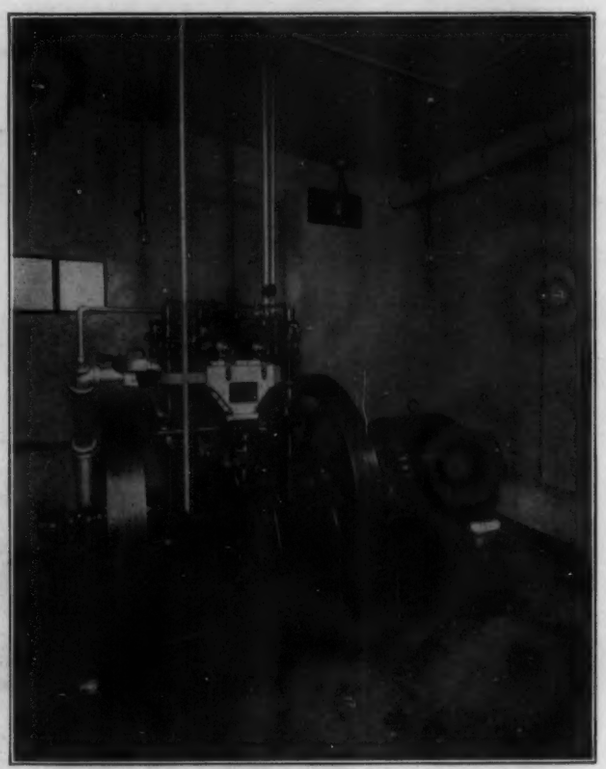
The building is of re-inforced concrete, in a beautiful combination of the Moorish and Mission styles of architecture, and situated so as to command an extensive view of the city of Santa Cruz and Monterey Bay. It is two stories in height and covers a ground area of 125 by 140 ft., and surrounds a glazed court 50 by 65 ft. It contains twenty-four apartments of two, three,

four or five rooms, a barber shop and a cafe. A spacious roof garden covers the entire roof area. The floors and roof are of re-inforced concrete throughout.

Power Equipment.

The power equipment consists of two units, one 35 kw., d.c. 115 volt, Ideal generator, 3 per cent over-compounded, direct connected to a 61 h.p. three cylinder Union engine, running at 325 r.p.m. and one 10 kw. d.c. 115 volt Ideal generator, 3 per cent over-compounded, direct connected to a 16 h.p. two cylinder Union engine, running at 425 r.p.m. Both engines start on gasoline and run on a low distillate, operating in multiple when the plant is operated at full load. The engines are regulated for a speed variation not to exceed three per cent, zero to full load, and this change occurs so quickly between these extremes that the fluctuation is hardly noticeable. The ignition of the engines is by the usual method, starting on battery and running on magneto, with the exception that any shut-down by a possible accident to either magneto has been forestalled by installing a switch to permit both engines to run on either magneto and throw-over switch on the battery circuit to enable the attendant to start either engine on either battery. The objectionable features of the exhaust are done away with by running separate exhaust pipes to a concrete pit 4 ft.x 4 ft. x 2 ft., placed 2 ft. underground at a distance of 40 ft. from the engines and covered by an 18 in. manhole cover to act as a relief valve should gas accumulate in the pit, and be fired by the exhaust. The burnt gases are cooled by discharging the water from the jacket of the engine into the exhaust pipe 2 ft. below the exhaust valves. The final result is an entire absence of smoke, smell and noise usually accompanying the operation of engines of this type.

35 kw. Generating Unit.



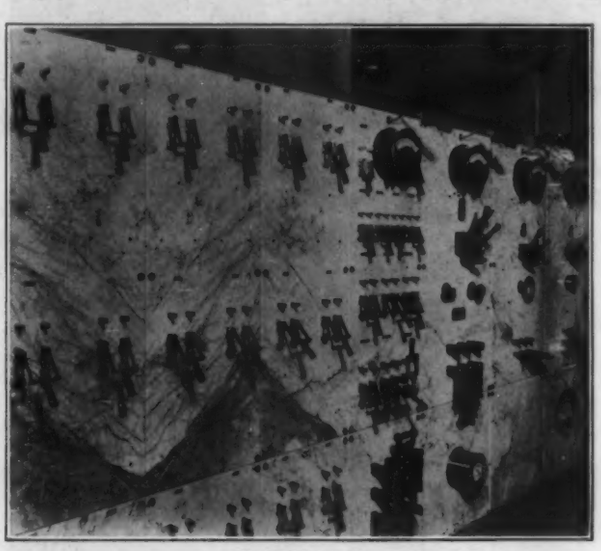
10 kw. Generating Unit.

Switchboard.

The switchboard is of white Alaska marble, 7 ft. high by 15½ ft. long. It is of panel type construction. Four sections 20 in. wide and 7 ft. high contain the switches for the apartments and spaces for the meters. One motor panel 22 in. wide and 7 ft. high carries the voltmeter, motor switches and the main switches for the public lighting. At the bottom of this panel has been installed a 400 amp. triple-pole, double-throw switch for cutting over the lighting to an outside source in case of emergency, leaving the motors, which are all of direct current type, to operate on the storage battery or either generator. One section 28 in.x 7 ft. for each generator, on one of which is mounted a 600 amp. Sangamo shunt type watthour meter which registers the entire generator output of the plant. The storage battery panel is unique in its absence of complicated switches to confuse the operator. The overload circui-breaker is equipped with an underload device, to protect the battery should the charging current fail, and a shunt release to open the breaker on full charge and discharge of the battery. This shunt release is also used in conjunction with the reverse current relay to protect the charging generator. I found it necessary to add to the equipment of this circuit breaker an auxiliary contact to open the circuit through the shunt trip coil to prevent any possible blistering of the contacts in the reverse current relay and ampere hour meter; also a device to prevent the dropping of the underload trip when the load fell below a predetermined value on discharge.

The ampere hour meter is of the Sangamo distant dial type with contact at zero and resetting device, and is compensated for overcharge and rapid discharge, and has totalizing circle for correct reading on discharge.

To charge the battery, which consists of 68 cells of Gould lead battery (Plante type) of 120 amp. hour capacity, the operation is to throw in to the charging position the circuit breaker and the triple pole double throw knife switch, which is equipped with two auxiliary contacts for the meter. This action cuts the battery into two equal parts and throws both halves in multiple across the charging circuit and through the auxiliary contact speeds the meter up 15 per cent for overcharge. When the battery has cut out on full charge



Switchboard.

and the switch is thrown in discharge position, the two halves of the battery are thrown in series, the voltage is adjusted to the line by the usual method through a hand operated rheostat of ample capacity in series with the battery. This battery occupies a space 3 ft. by 22 ft. in a specially constructed battery room adjoining the engine room and every precaution is taken to prevent the battery fumes from penetrating to any part of the building.

Electric Equipment.

The rotary burners of the heating and hot water boilers are supplied with crude oil by electric driven pumps. The cleaning of the building is done by a stationary vacuum cleaner in the basement driven by a 1½ h.p. motor equipped with a self-starter, so that it can be operated direct from the engine room.

An electrically driven elevator for freight and passengers runs from the basement to all floors and the roof garden, and an electrically driven dumb waiter carries the food stuffs from the kitchen to the cafe.

The lighting of the court, a portion of which is shown with fountain in the foreground, is arranged to be controlled as a theater. Ample provision has been made for lights for musicians, spot light, receptacles set in the ceiling for festooning the court for special occasions and base plugs at the first floor level for individual tables or writing desks. The ventilating skylight of this court is raised and lowered by an electric motor by the simple pressing of a button, the motor and mechanism automatically taking care of the distance of travel, direction and stop.

Wiring.

The wiring of Piedmont Court is entirely in Electroduct conduit with the exception of the wireway in the basement. This wireway is 4 in. by 12 in. and is 400 ft. long, running the entire distance of the basement hallway and picking up the cables feeding the various apartments and panel boxes. It is constructed of 14 gauge black iron and has a removable cover screwed to a 4 in. channel of the same gauge metal, and is suspended from the ceiling by ½ in. crowfeet set 6 ft. apart and cast into the concrete. This method is cheaper than conduit in cost and installation and much more easily handled when it came to putting in the wire. The wireway is tapped at the switchboard by a section 6 ft. wide (shown in black above the generator panels) which allows the wires ample room when they come through for distribution to the various switches.

The apartments are well supplied with base plugs for various electrical devices. Brackets are located at each wall bed for reading and at each wash basin for shaving. All closets are supplied with 15 watt tungsten lamps, and perhaps the most novel departure in the way of convenience and assistance for the housewife is the provision of each apartment with Copeman automatic electric cooking stoves, by which the family meals may be prepared with the minimum of attention.

The building is equipped with Pacific telephones for interior, local and long distance communication, contained in a single unit, one of which is located in each apartment and at various convenient points about the building and on the roof garden. There are no chimneys or ventilating flues from the apartments in this building, except the chimney from the boiler room. It was the original intention of the writer to circulate the water, which cools the engine cylinders, throughout the building by an electrically driven pump, thereby saving this waste heat and eliminating this chimney.

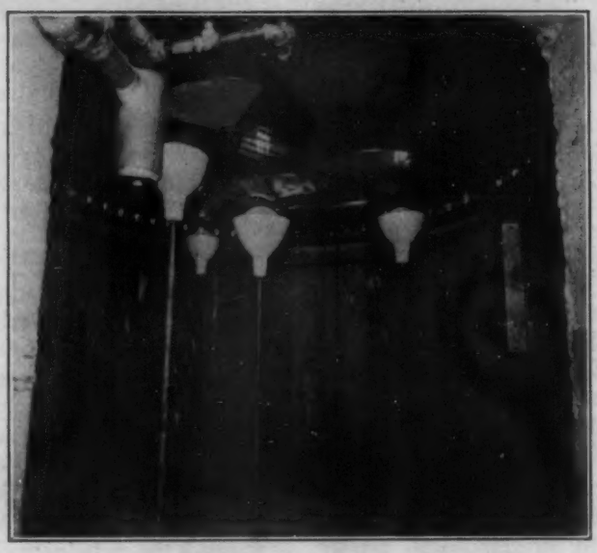
Electric Fountain.

In this court is an electric color-changing fountain, the reservoir of which is 8 ft. in diameter, surrounded by a circle of 60 tungsten lamps with reflectors set 6 degrees apart, around a ring under the reservoir and concealed from view from above. The upper portion of the reservoir is fitted with spun brass rings, soldered on the under side of it, and directly over the lamps. Over these are fitted round pieces of blue, red and yellow glass, the Moorish colors, 3 in. in diameter, and the whole made water tight by setting up in a compound of litharge and glycerine, and a second retaining ring covering the edge of the glass and tacked with solder to the upper part of the reservoir.

The nozzles, fitted to containers, through which the water comes, form four geysers, one 13 in. in diameter at the center of the reservoir and three 9 in. in diameter set around a circle 51 in. in diameter, 120 degrees apart. These containers are made of two

Court and Electric Fountain.

sections of spun brass of different diameters brazed together so as to form a series of jets around the periphery of the circle which unite to form the geyser. The nozzles are 1 in. long to permit of adjustment and have an inside diameter of .0312 in. and are set .3 in. apart. This container sets over a thimble soldered to the bottom of the reservoir and raises to a height of 4 in.; over it is placed a circular piece of plate glass set in a litharge-glycerine compound and held in place by a retaining ring. By this arrangement I succeeded in raising a comparatively small amount of water to a greater height than could otherwise be obtained without an expensive pumping plant, and at the same time broke the water up into a fine spray or mist which I found could be colored to a greater height and at less expense than by using a greater volume of water without this arrangement.



Fountain Mechanism.

The color changes are made in a simple way and are continuous and constantly varying. A combination of red, blue, yellow and clear glass discs, cut in four equal sections to form a circle and the whole held together under a clamping device at the center and kept secure by a binding of lead such as is used in art glass manufacture, is rotated by an electric motor at a speed of three revolutions per minute between powerful tungsten lights set in reflectors directly below the clear circular glass discs. The result is pleasing and no great expense is attached to operating the fountain as it consumes only 130 cu. ft. of water and 3000 watts per hour. The colors are constantly blending and many different tints are thrown upon the spray, leaving a pleasing impression of its performance. There is no evidence of the mechanical regularity so tiresome in fountains of this type.

GENERAL PROGRESS REPORT OF COMMITTEE ON INDUCTIVE INTERFERENCE.

The Committee of Engineers representing the electric wire interests in the State of California, authorized by the California State Railroad Commission in December, 1912, to investigate the subject of inductive interference between power and communication lines and to make recommendations for commission rulings intended to prevent undue interference, reports progress up to September 1, 1913, as follows:

Since the first of the year a field force of from five to eight experimenters and computers has been engaged in collecting and computing data under instructions from the committee. The field force is equipped with a large amount of apparatus, including an oscillograph having three vibrators, noise standards, an impedance bridge, complete equipment for harmonic analyses and instruments of various kinds, the total aggregating in value approximately $9,000. Some of this equipment has been necessarily designed especially for this work.

Equipment is provided for harmonic analyses by either or both of two methods. The first involves the use of the oscillograph, the recorded waves of which are greatly improved for harmonic analysis by the use

Interior View of Laboratory, Showing Testing Apparatus.

of a distortion circuit. This consists of a circuit containing inductance and capacity so chosen as to give distortion of the harmonics in approximate proportion to the square of the order of the harmonic. The second method of harmonic analysis is by means of the use of what is termed the resonant shunt. This consists of a circuit containing inductance and capacity so chosen that in combination with the capacity of the telephone line the whole circuit can be made to resonate for any particular frequency or harmonic, the magnitude of which it is desired to measure. The currents so obtained are too small for direct measurement by any instruments available or suitable for this purpose. For this reason each current so obtained is passed through a telephone receiver, and the amount of noise given by same is equated with the noise in the same receiver produced by a current of the same frequency and of sinusoidal wave shape produced by a wave generator consisting of a Vreeland oscillator. The latter current is computed from the constants of a circuit supplied by a measured potential difference.

The noise standard above mentioned is an instrument designed to measure the volume of noise that is produced by the current induced in the telephone line. This is accomplished by equating the noise set up by this complex wave in a telephone receiver with the noise set up by a pure sine wave of known amplitude having a frequency of 240 cycles. This comparison, of course, involves, in a large measure a personal element, but this is reduced in these tests by taking as a rule the average results of four observers trained to the work by experience.

The parallels on which this work has now been completed are four in number, all of which involve one telephone line. This is the main coast line trunk lead of the Pacific Telephone and Telegraph Company (the Bell System on the Pacific Coast), between San Francisco and Los Angeles. These parallels are all located in the Counties of Santa Clara and Monterey, between San Jose and King City, a distance of approximately 120 miles. The telephone lead consists in the main of ten copper physical circuits, part of which are loaded and some of which are made up into phantoms. The high tension portions of these exposures are as follows:

First—A 57,000-volt 3-phase line of the Sierra and San Francisco Power Company, approximately 20 miles long, between San Jose and Gilroy.

Second—A portion of the same line, approximately eight miles long, running into Salinas.

Third—A 22,000-volt 3-phase line of the Coast Counties Gas and Electric Company, approximately 16 miles long, between Morganhill and Sargents, and overlapping the above-mentioned line of the Sierra and San Francisco Power Company from Morganhill to Gilroy, for a distance of approximately 10 miles.

Fourth—A 33,000-volt 3-phase line of the Coast Valleys Gas and Electric Company. approximately 40 miles long, between Salinas and King City.

All of the above power lines are operated at 60 cycles.

In all cases the telephone pole line is on one side of a public highway, and the power line or lines on the other side, with an average separation of approximately 60 ft. The power lines of the two separate companies overlapping as mentioned above, are erected one above the other. As these two power systems are operated from separate sources not in synchronism with each other, and as neither one can be shut down to enable the influence of the other to be independently measured, the difficulties of analyzing the inductive effects in this exposure have been enormously increased.

In order to eliminate the effects of induction from other power systems on through telephone circuits and from them to lines under test in the various exposures, it is necessary to cut all telephone circuits on the lead at the two ends of the exposure under test. Since the telephone lead is a main line of vital importance to the system of the telephone company, it has been necessary to make practically all tests between the hours of 10 p. m. and 6 a. m.

Since the line of the Sierra and San Francisco Power Company between San Jose and Salinas is the only source of electric power for the greater part of Monterey County, it has been impractical to suspend

service on this line for obviously desirable special tests, such as single phase short circuit runs with ground return, the application of single phase potential to ground on open circuit, etc., except on the rare occasions of general changes made by the power company, thus increasing the difficulties of the investigation.

The system of the Sierra and San Francisco Power Company is operated with a solidly grounded neutral, and facilities were available for readily grounding the neutral of star connected transformers in the substation at Salinas, or removing the ground connection. This has enabled a thorough comparison to be made of the inductive effects of this system; first, with a neutral ground beyond one end of the exposure; second, with a neutral ground beyond each end of the exposure, the latter condition giving a return path through ground for unbalanced currents in the line conductors. The system of the Coast Counties Gas and Electric Company is operated without a grounded neutral, making it possible to obtain a certain amount of comparative data between grounded and ungrounded systems, the comparison being limited by the facts that the two systems are of different voltage with different lengths of exposure largely overlapping, different sizes of conductors, different spacing of power wires, etc.

Thorough investigations have been made of residual and balanced currents and voltages in the power systems, of the shielding effects of other wires on the telephone lead, of the existing transposition systems in both the power and telephone lines, and of the relative locations of the power and telephone transpositions; also of the effects of modifications of these transposition schemes.

Throughout parts of the above exposures of the telephone line, the same power lines parallel the Western Union telegraph wires and the signal circuits of the Southern Pacific Company on the railroad right of way of the latter company. The effects of the power lines on these circuits have been included in the investigation.

The analyses of the inductive effects have been laborious on account of the large number of different forms of induction in action simultaneously. These may be listed as follows:

First segregation—Electrostatic and electromagnetic.

Second segregation—Effects of balanced and of residual currents or voltages.

Third segregation—Longitudinal and transverse induction.

The terms used by this committee under the above third segregation may be defined as follows:

Longitudinal induction is that which sets up an e.m.f between a wire and ground, or a current through a wire with a ground return, or a current induction is that which sets up an e.m.f. between two wires, or a current in a circuit made up of two wires without a ground connection. It is obvious that in the case of a phantom circuit the transverse induction is that between the two sides of the phantom, each consisting of two wires. It is also obvious that in general the transverse effect is the difference between the longitudinal effects on the two sides of the circuit. It is also obvious that the transverse induction is that of chief interest from the standpoint of interference with telephonic transmission.

Referring to the above segregation, attention may be called to the fact that each form of induction, transverse and longitudinal, is due in part to electrostatic and in part to electromagnetic influence, and that only one of these four effects transverse electrostatic, transverse electromagnetic, longitudinal electrostatic and longitudinal electromagnetic, is due in part to the balanced currents or voltages and in part to residual currents or voltages. In order to make a complete study of the effect of transpositions, each of the eight effects must be considered independently. The transposition problem is further involved by the necessary transposition system of the telephone wires between themselves to avoid crosstalk, which in itself is elaborate on a heavy lead.

In the case of the exposures so far investigated, it has been impossible to get enough transverse induction under normal operating conditions to obtain oscillograph records of sufficient amplitude for harmonic analysis. The study of the transverse induction has therefore been limited to the results obtained from the noise standard and the use of the resonant shunt apparatus. A difficulty introduced by this condition is that the use of the resonant shunt apparatus involves successive measurements of the several harmonics. Between the times of these measurements the load on the power system may and does vary, and what is more essential, the shape of the waves of the power system, and particularly of the residuals and of the neutral current of same varies.

On the whole, the investigation, so far as the currents and voltages of the power system are concerned, has resolved itself into a determination of the relatively small difference between almost exactly equal quantities, that is, into a determination of the residual voltages and currents which are minute, compared with the main voltages and currents. This has involved an elaborate study of the errors introduced by the use of the necessary current and potential transformers, and particularly of the effects of same on the higher harmonics. As might be expected, the work of computation and the analyses of the data obtained greatly exceed the work of actually making the tests.

The joint committee has a membership of fifteen engineers, part of whom represent the power interests, part of communication interests in the State of California and part the State Railroad Commission. The necessary funds for the work have been voluntarily contributed by the power and communication interests of the state. A large amount of the apparatus used has been loaned by the Pacific Telephone and Telegraph Company, some has been purchased by the committee, and a relatively small amount, consisting of current and potential transformers, oil switches, etc., has been loaned by the power companies.

So fas as can be determined by the members of the committee, no investigation of these complicated phenomena has ever been undertaken heretofore on a scale comparable with that of this work, either in magnitude or in the matter of thoroughness. The study has developed into an investigation of much

greater scope and complications than was originally anticipated. Although eight months have already been spent on this work, which has not been allowed to drag, but has been pushed continuously and as rapidly as possible without detriment to the work, the investigation has not as yet been made on a sufficiently large number of exposures of different characteristics to allow of any general conclusions. No statement can as yet be made regarding the recommendations of this committee on this set of exposures, since these recommendations have not as yet been presented to the State Railroad Commission. While the complications of the problem now appear to those carrying on the work so great as to make extremely difficult the drafting of general remedial measures which shall not be onerous on the interests involved and shall not be subject to so many exceptions and alternatives as to make them ineffective, the committee expects that with sufficient time and financial assistance this work can be made to serve as a basis of rulings which will be not only helpful to the communication interests, but also to the power interests in the way of standardization of construction and operating methods and the reduction of interruptions to service. Members of the committee also feel that, more important than the above, the work will enable the Railroad Commission to make rulings which will in future reduce harmful agitation, legislation and litigation.

GAS SERVICE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

Steam service will be available in the Palace of Machinery during the day hours only. Saturated steam, at a pressure of 150 pounds will be furnished through a system of mains from the Fuels Building immediately in rear of the Palace of Machinery, and from the central station. In like manner, 1000 to 1500 boiler horsepower of steam will be supplied. In the Fuels Building will be established at such exhibits as steam and gas producers. These will be working exhibits and subject to exposition awards. Steam generated in this exhibit plant will be disposed of for satisfying the steam requirements of other exhibitors.

A limited supply of compressed air at 80 pounds pressure will be available in the Palaces of Machinery, Mines and Metallurgy and Transportation. The exposition will install a distributing system to these palaces, based on the use of standard screw pipe of sufficient size to handle the quantity requirement. The present plans contemplate the installation of an equipment sufficiently large to deliver 1500 cubic feet of free air per minute. This may or may not be acquired on exhibit basis.

Dull months are a "habit" and a "state of mind" more than anything else. They do not belong in the scheme of modern business economics. There is always a way to get more business. There is always a way to stimulate sales. There is always a way to bring the buyers to your store or the orders to your desk. If you'll tell the public what you have, tell it to them in the right way, and keep at it, you can make the dullest month in the year produce good business.

ELECTRICITY IN THE LUMBER INDUSTRY.

BY ALLEN E. RANSOM.[1]

The use of electricity in the manufacture of lumber has developed, within the last decade, to a point where it demands the attention of lumber manufacturers as a means of reducing the cost of production and effecting a definite conservation of material in its transit from standing timber to the finished lumber.

The object of this paper is to try and set forth just what can be and has been done in this important field, and the possibilities it offers to the field of applied electricity.

The data available is becoming more specific and reliable each succeeding year, and in our Northwest country the various associations interested have had this subject presented in various forms for several years. The proceedings of the "Pacific Logging Congress," an organization composed of the various logging and lumbering interests of the Pacific Coast, has given this subject considerable study and discussion; and with the increasing mileage of transmission lines and power plants in our timbered sections, this outlet for power is ultimately going to develop into commercial recognition and profit to both the user and the transmission company.

The reasons for the use of electricity are so well known that we will not take up space in setting these forth, but proceed to facts and figures of existing mills.

Mill A

Location—Northwestern Montana.

Source of Power Supply—Own plant. Auxiliary from Power Transmission Company 750 k.v.a. 440 volt. 3600 r.p.m., 3-phase, 60 cycle, steam turbines, 150 lb. pressure, condensing. The only steam used in this mill is for operation of carriages, log turners and kickers; in its mechanical operations and in the dry kilns and log ponds for thawing and clearing logs of ice in winter.

Daily Capacity—800,000 ft. per day.

Fuel—Mill refuse.

Kind of Timber—Yellow pine, larch and tamarack mostly.

Motor Applications—All motors 3-phase, 60-cycle, 440 volts.

Pump House—100 h.p.; wound rotor; 495 r.p.m.; geared to 10x12 in. 1000 G. P. M. fire pump and controlled by automatic pump starter on motor. 5 h.p. motor on 4x4 in. triplex pump; 3 h.p. geared to 5x5 in. plunger pump; 3 h.p. geared to small air compressor. Auxiliary to above pump house station is a transformer house, in which are installed: Three transformers of sufficient capacity to operate 100 h.p. fire pump motor from Power Transmission Company. System which transmits power at 11,000 volts adjacent to the mill company's property also. Three 250 kw. transformers, with connections on the 11,000 volt primary side to the Power Company Transmission System; and on the 440 volt secondary side to the entire mill power wires.

Boiler House:

One 15 h.p. motor, and one 20 h.p. motor run cross conveyors for stokers and sawdust conveyors to fuel bins.

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[1]Paper presented before the N. W. Electric Light and Power Association Convention, Seattle, September 3-5, 1913.

Mill.

Two 8-in. hand mills, each operated by 150 h.p. wound rotor, 580 r.p.m., belt connected motor with idler pulley.

Log Haul—Operated by a 50 h.p. 850 r.p.m. motor. Squirrel cage type. The auto starter for this motor is located at head of log haul.

Band Saw—Operated by 50 h.p. squirrel cage motor.

Edger—75 h.p. 1700 r.p.m. squirrel cage motor connected to a 96x8 in. edger, with 4 saws each end.

Pony Edger—30 h.p. squirrel cage motor. Twelve saw trimmer. Operated by 30 h.p., 565 r.p.m. squirrel cage motor, coupled to trimmer jack shaft.

Saw Slasher—Direct coupled to 30 h.p. 850 r.p.m. squirrel cage motor. Timber cut off saw operated by 5 h.p. squirrel cage motor. Sorting works operated by 30 h.p. motor; 380 ft. long. Also lumber loader operated by same motor.

1—30 h.p. motor—Running Lath Mill.
1—50 h.p. motor—Running Bolter.
1—10 h.p. motor—Running Cut-off Saws.
1—10 h.p. motor—Running Stove Wood Slasher.
1— 5 h.p. motor—Running Filing Room.
1—20 h.p. motor—Running Log Transfer.
1—30 h.p. motor—Running 260-ft. of Timber Transfer Chains.
1— 5 h.p. motor—Running Slab Conveyor.
1—75 h.p. motor—Running Chain to Burner and Slab Chains in Lath Room.
1—30 h.p. motor—Running Sawdust Conveyor length of Mill.
1—10 h.p. motor—Driving Live Rolls and Transfer Chains to resaw.
1—15 h.p. motor—Driving Live Rolls to Transfer Chains.
1—20 h.p. motor—Driving Transfer Chains from Edgers to resaw.
1—30 h.p. motor—Driving Transfer Chains to Slasher and Live Rolls from Lumber Transfer and Band Mills.
1—15 h.p. motor—Driving Timber Transfer and Lumber Transfer Laths.
Total—30 motors.
H.P. installed—1191.

This mill is a typical example of an electric driven mill and also illustrates the feasibility of an outside source of power from a nearby transmission system:

With comparatively small variation of equipment and application of the motor drive, which differs according to the kind and size of timber, there are now operating commercially over 50 mills in Montana, Washington, British Columbia, Idaho and Oregon, using electric power wholly or in part, in the manufacture of lumber by means of electric logging donkeys, main mill drives as just shown, planing mills, box and tank factories, etc., auxiliary to the main mills.

The load factor of a mill, equipped electrically as above, is about 50 per cent; planing mills 60 per cent; logging donkeys 40 per cent of the h.p. installed.

The following report of an electrically driven planing mill purchasing power from a transmission company will prove of interest:

MILL B—Northwestern Washington:
Power supplied—220 volts, 3 phase, 60 cycle.
Connected Load—315 h.p.
All Planers, Stickers and Blowers direct connected to motors.
Location—Northwestern Washington.
Date—March 31, 1912—December 31, 1912.
Feet of Lumber Manufactured—3,677,447 ft.
Lin. ft. of Mouldings in B. Measure—170,200 ft.
Total—3,847,650 ft.
Power Consumed—160,886 kw.-hr.
Average per month—17,876 kw.-hr.
Average per M. ft.—41.8 kw.-hr.
Average cost per M. ft.—$0.41.
Rate—$0.01 per kw.-hr.
Minimum—$1.00 per h.p. per month, Max. demand.

The following wattmeter tests were made right at the machines in commercial operation and illustrate the average daily operations of planing mill machines, their output and power consumed and which are average examples of similar conditions in mills using Washington and Oregon fir.

Wattmeter, Start.	Stop.	K.W.	Bd. ft. per K.W.	Time. Start.	St'p.	Load No.	Dimensions. Rough.	Finished.	Lin. ft. and Board.	Rate of Feet.
588	605	17	115	7.05-	7.40	1	2x6"	1 5/8x5 1/4"	1950	60'
2	"	"	571	"		605	613	8	71	7.46- 8.03
3	"	"	1866	"		613	630	17	109	8.07- 8.42
4	"	"	1522	"		630	645	15	104	8.48- 9.16
		Change Material—Green Hemlock.				Finished—One side surfaced.				
5	1x12"	3/4x12"	1481	68'		654	652	7	211	9.24- 9.52
6	"	"	1289	"		652	657	5	255	9.55-10.14
7	"	"	1406	"		657	662	5	281	10.16-10.37
8	"	"	1280	"		662	668	6	213	10.44-11.03
9	"	"	1378	"		668	673	5	278	11.08-11.28
10	"	"	1438	"		673	679	6	240	11.30-11.53
Noon Hour.									Empty	11.56-12.00
11	1x8"	¾x8"	1802	68'		679	685	6	200	12.50- 1.11
12	"	"	2147	"		685	693	8	179	1.14- 1.45
13	"	"	21.40	90'		693	699	6	238	1.49- 2.12
										2.19- 2.34
14	1x12"	3¾x12"	1117	90'		699	704	5	223	2.36- 2.38
Change Material—Green Fir.			Finished—Silo Tank			Stock.	Both sides Matched.			
15	2x6"	1⅝x5¼"	1074	60'		704	714	10	174	3.11- 3.32
16	"	"	1768	"		714	729	15	118	3.34- 4.04
17	"	"	902	"		729	736	7	129	4.12- 4.28
18	"	"	2073	"		736	757	21	99	4.31- 5.09
19	"	"	1455	"		757	768	11	132	5.17- 5.42

Total days run, 472 minutes = 7.8 hours. Kw.-hr. consumed = 180.
Planed, total lumber = 28659 ft. Bd. ft. per kw. = 159.

TEST No. 1:

Motor—50 h.p., 2-phase, 60 cycle, 440 volt, 53 amps., 850 r.p.m.
Machine—No. 20, 15-in., S. A. Woods Matcher.
Material—Kiln Dried Fir. Pipe Staves, Surfaced 2 sides. Bev. Edges.

Load.	Dimensions. Rgh.	Fin.	Lin. ft.	Bd. ft.	Rate of Feed per min.	Wattmeter Start.	Stop.	K.W.H.	Bd. ft. per K.W.H.	Time Str.	St'p.
1	2x6"	1 3/4x5 9/16"	0	0	72'	4526				7.02-	7.20
1	"	"	1420	1420	"		4541	15	95	7.25-	7.28
2	"	"	1540	1540	"	4541	4554	13	118	7.28-	7.52
3	"	"	1048	1048	"	4554	4570	16	66	7.52-	8.25
4	"	"	920	920	"	4580	4580	10	92	8.25-	8.48
5	"	"	628	628	"	4580	4587	7	89	8.48-	9.05
6	"	"	1056	1056	"	4587	4596	9	117	9.05-	9.24
7	"	"	1230	1230	"	4596	4609	13	95	9.24-	9.52
8	"	"	1710	1710	"	4609	4626	17	100	9.52-	11.03
9	"	"	1840	1840	"	4626	4645	19	97	11.03-	11.47
10	"	"	1502	1502	"	4645	4660	15	100	11.48-	1.11
11	"	"	1384	1384	"	4660	4671	11	126	1.11-	1.33
12	"	"	934	934	"	4671	4680	9	104	1.33-	1.53

Total Run—5 hours 45 min.
No. ft.—15,212.
Kw.-hr. used—154.
Bd. ft. per kw.—99.

TEST No. 2:
Motor—100 h.p., 440 volts, 60 cycle, 2-phase, 680 r.p.m.
Machine—70-inch Double Sturtevant Fan.
Main Discharge, 32-in. diameter. 500 ft. long.
Intake Pipes, 3-9-in. Pipes.
3-8-in. "
10-7-in. "
17-6-in. "
6-5-in. "

Plaining Machines connected to Fan:
1 resaw.
1 Sticker.
7 Planers.
1 Timber Planer.

Average Days Run:
Start 6:52 a. m. Stop 6:00 p. m.
Total minutes run during day, 623 = 10.4 hours.
Wattmeter reading at 6 p. m., 3764 kw.-hr.
Wattmeter reading at 6.52 a. m., 2976 wk.-hr.
Kw.-hr. during day, 788.
Average load on Fan = 78.8 kw.

TEST No. 3:
Motor—60 h.p., 440 volt, 60 cycle, 3-phase, 850 r.p.m.
Machine—Slow speed, high power, Sturtevant, double 55 Fan. Main discharge pipe, 30-in. in diameter; 700 ft. long.
Intake Pipes, 2-8-in. Pipes.
2-7-in. "
10-6-in. "
3-5-in. "
5-4-in. "
1 extra vent about 35 sq. in.
Fan connected to:
1 Flooring and siding machine.
1 Planer.
1 Sticker.
4 14-in. Swing Cut Off Saws.
1 12-in. Rip Saw.
1 Resaw.
Motor started 7:30 a. m. Stopped 6 p. m.
Days run, 6½ hours.
KW. Consumed, 281.
Average Load on Fan, 31 kw.

TEST No. 4:
Motor: 50 h.p., 440 v., 3-phase, 60 cycle, 850 r.p.m.
Machine: Berlin No. 94 Planer:
Top—Cutter head. Square—4 knives.
Bottom—Cutter Head. Square—4 knives.
Side—Cutter Head. Matcher—4 knives.
Material: Green Fir. Finished—Silo Tank Stock. Both sides matched.

The foregoing tables and descriptions are made from operating mills, and in connection therewith a number of interesting installations of motor driven donkeys for use in the woods are in service at Elk River, Idaho, and Marshfield, Oregon, the power from same being transmitted from the mill power station or supplied by transmission lines; stepping down to the operating voltage of 440 volts, 3-phase, 60 cycle, and carried from the step down station to the donkey by means of 3-wire flexible wire wound cable. Motors of the wound rotor type; speeds about 600; horsepower 150-165, are direct connected to standard logging engines and by means af automatic circuit breakers; drum type reversing controller, and air whistle signals; the handling of the logs in the woods by electricity has demonstrated its advantages in reduced labor cost, less fuel consumption; elimination of fire risk and flexibility of service.

The increasing number of transmission lines in the Pacific Northwest through timbered sections through districts where operating mills and logging camps are running makes probable and possible the installation of substations and the sale of electric power.

The average donkey in the woods will handle from 30,000 to 40,000 ft. of logs per day. Several tests of electric donkeys in this service have indicated a load factor of from fifteen to forty per cent and a current consumption of from 15 to 20 kw.-hr. per 1000 ft. of logs handled. Assuming a rate of 1.5 cents per kw.-hr. and a minimum of 1.00 per month per h.p. maximum demand the logs can be handled at a cost of not to exceed 50 cents per 1000 ft., and make a saving to the lumbermen of nearly one-half over the present methods of steam haul, in saving of labor, reduction of fire risk, labor and expense of getting water to the donkey, elimination of boiler explosions and repairs, and conservation of his supply of logs.

The cost of the electric donkey itself together with the necessary cable, portable substation and temporary transmission line to the point of operation does not make a prohibitive investment to the lumberman.

Some of these facts, therefore, give us an idea of the possibilities of electric application in this great industry.

Recent statistics show that the lumber industries of the country today employ about 700,000 men. The products of their labor reach nearly one and one-fourth billion dollars annually and three-fourths of a billion more by manufacturing this material into other commodities.

There are nearly two hundred million acres of forest land in the United States in American possession and conservation, economy of production, and efficiency has called electricity as the factor to gain these ends.

GAS SERVICES PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

There is to be a high pressure distributing system of gas mains throughout the grounds of the Panama-Pacific International Exposition at San Francisco in 1915, and gas will be furnished in all exposition palaces. Oil gas, as made and used in California from crude California petroleum and having a heat value of 600 B.t.u. per cubic foot or more, with a candle power in excess of 18, will be served to participants at a pressure of 30 pounds. This gas is exceptionally free from sulphur and other impurities. The pressure may be reduced to anything less than 30 pounds, and suitable for the use to which the gas is to be put, by means of regulators. The low pressure in buildings will be about 6 in. of water pressure.

Gas will be used for many lighting and heating purposes, and no other source of heat will be allowed, except electricity, unless special permission has been granted otherwise. The rules and regulations of the exposition company are very strict on this point, with a view to reducing the fire hazard to a minimum.

All of the ground lighting for emergency purposes will be by means of gas arcs. This provides essential secondary lighting system throughout the main exhibit palace district and about such other exposition buildings and entrances as public safety may require. In the states and foreign section and in the concessions district, the street lighting will be by means of gas arcs. The rules and regulations provide that all light furnished by others than the exposition company, whether for decorative or other purposes, shall be of uniform brilliancy and all light sources of great intrinsic brilliancy shall be fitted with suitable globes or diffusers, so as not to cause a disagreeable effect upon the eye.

ELECTRICAL PUMPING AND IRRIGATION

THE SELECTION AND INSTALLATION OF A SMALL PUMPING PLANT.

(Continued)

BY B. A. ETCHEVERRY.

The capacity of the pump will depend on the diameter of the cylinder, the length of the stroke of the piston, and the number of strokes or revolutions per minute. The capacities of a few sizes of double acting, single piston pumps, single acting triplex pumps and of double acting duplex pumps are as follows:

Capacity of double acting, single piston pump.

Diameter of water cylinder.	Length of stroke.	Revolutions or strokes per minute.	U. S. gallons per minute.
3"	5	40	12.4
4	5	40	21.6
5	5	40	34.
6	6	40	58.
7	6	40	80.
8	6	40	104.

Capacity of single acting, triplex piston pump.

3	4	50	18
4	4	50	32
4	6	50	50
5	6	50	76
5	8	45	91
6	8	45	131
7	8	45	180
7	10	42	210
8	10	40	270
8	12	40	310
9	10	40	340

Capacity of double acting, duplex pumps.

Diameter of water cylinder.	Length of stroke.	Revolutions or strokes per minute.	U. S. gallons per minute.
2¼	4	75	20
3	4	75	36
3½	6	60	58
4	6	60	78
5	6	60	120
6	6	60	174
5	10	50	170
6	10	50	245
7	10	50	334
8	12	50	522
9	12	50	660

The sizes of pumps and the capacities vary with the different manufacturers. The values stated above show the approximate range of the different sizes. For small capacities the double acting single piston pump may be used.

Deep well pumps are used where the water plane is at large depths below the ground surface. A deep well pump consists of a brass cylinder in which operate two plungers with valves. The lower plunger is connected to a solid rod which fits into a hollow rod to which the upper piston is connected. The plungers are so operated by the driving power that the pump is double acting, one plunger moving up while the other moves downwards, so that there is a continuous discharge. Above the cylinder and connected to it is the vertical discharge or column pipe into which discharges the water passing through the valves in the plunger. The cylinder is about 2 inches smaller in diameter than the well casing and the delivery pipe about 1 in. less; the cylinder and delivery pipe are both lowered into the well until the plungers are under water. At the surface the driving power and circular motion of the belt of the engine is transmitted to the driving rods by means of gears and levers combined into a lower head designed to produce overlapping strokes, so as to eliminate to some extent the pulsations, which are further decreased by an air chamber. The sizes range from 6 in. cylinders and 28 in. stroke to 16 in. cylinders and 36 in. stroke. The number of strokes ranges from 16 to 24 per minute, depending on the lift and the size. The maximum lift is 350 ft. The capacity ranges from about 115 gallons per minute to a maximum of 1000 gallons for the largest pump with extra long cylinder.

Air lift or compressed air pumping plants consist of one or more air lift pumps. The air compressor with receiver and motive power and the necessary piping to deliver the compressed air from the receiver to the pumps. Each pump consists of: (1) The discharge pipe, which is smaller than the well casing and is placed inside of it, extending below the water surface to a depth equal to 1½ or 2 times the lift measured from the water surface; (2) The air pipe, which is usually inside the discharge pipe, but may, if the well is enough larger than the discharge pipe to so permit, be placed outside and connected at the lower end of the discharge pipe by means of standard fittings or special castings; (3) The foot piece which is a special casting connected to the lower end of the air pipe and so designed to admit the air evenly in small bubbles. There are various designs of patented foot pieces, but there is little difference in their efficiency; (4) The tail piece which forms a slightly enlarged extension of the lower end of the discharge pipe below the foot piece. The air is delivered through the foot piece at pressures varying according to the lift and the ratio of diameters between air pipe and water pipe, and its expansion and displacement produces the lifting power. The relation between the volume of air supplied and the volume of water pumped for different lifts has been found by experiment to be as follows:

Head in feet.....	10	20	30	50	100
Ratio—					
Cubic feet of air....	1.0	1.5	2.0	2.5	3.0
Cubic feet of water..	1.0	1.5	2.0	2.5	3.0

The velocity of water in the discharge pipe, based on the volume of water pumped should not exceed 5 ft. per second in order to keep down friction losses.

The compressor may be direct connected to a steam engine or gasoline engine or may be connected by means of belts, gears, etc., to the driving power which may be a steam engine, a gasoline engine or electric motor. The compressed air passes from the air cylinder to the receiver, which is used to store the air and equalize the pressure. From the receiver the air is conducted through pipes to each well.

The efficiency of the plant when properly installed as calculated from the ratio of actual water horsepower to the indicated horsepower in the cylinder of the engine is generally between 20 and 30 per cent. Air lifts are best adapted for pumping from several wells not farther apart than ½ mile and where the wells are sufficiently deep to allow proper submergence.

The hydraulic ram works on the principle that a large volume of water falling through a low head will pump a smaller volume of water through a higher head. The ram consists of the valve box and air vessel, the supply or drive pipe which connects the valve box with the source of supply and the delivery or discharge pipe which connects the air vessel with the point of delivery. The efficiency of the plant is $E = qh/QH$ where q = volume of discharge water, h = discharge head in ft. above ram, Q = volume of drive water, H = drive head in ft. For best results the ratio of the length of drive pipe to the length of drive head should not exceed 2.5; but it is practicable to increase this ratio to 25 and use a drive pipe 1000 ft. long. The delivery head may be anything up to about 250 ft. ond the drive head anything above 18 in. The efficiency diminishes as the ratio of delivery to drive head increases. With this ratio as great as 30 to 1 the efficiency will not be over 20 per cent; with a ratio not greater than 4 to 1 the efficiency may be as high as 75 per cent. Rankine gives the following equation to determine the efficiency for varying ratios of drive head to discharge head: $E = 1.12 - .2\sqrt{\frac{h}{H}}$

Hydraulic rams are usually limited to small quantities of water. A notable example of a large plant for irrigation purposes is one installed at Sunnyside, Washington, for the irrigation of 240 acres of land. The plant was installed by the Columbia Steel Works of Portland, Oregon, and consists of eleven 6 in. rams, with a common discharge cylinder emptying into a 10 in. wood stave discharge pipe. The plant is used to irrigate 150 acres under 105 ft. lift and 90 acres under 144 ft. lift. The lifts are measured from rams. The drive head is 38 ft. and the drive water 5 second ft. the plant was furnished under guarantee to deliver .75 second ft. at higher outlet. The cost of plant is as follows:

11 6-in. rams and 3212 feet of wrought iron drive pipe	$3,200
1900 feet of 10" wood discharge pipe	608
Installation complete	2,000
Total cost	$5,808

No maintenance except two visits per day to clear weeds out.

An efficiency test gave the following results: H = 37.6; h = 144.1; Q = 6.25; q = 1.15:

$$E = \frac{1.15 \times 144.1}{6.26 \times 37.6} = .70$$

[To be continued.]

TELEPHONE STANDING OF THE WEST.

It is intensely gratifying to note that Los Angeles and San Francisco are the two best developed telephone cities in the world; other western cities among the foremost being Spokane, Wash., and Portland, Oregon.

The latest available statistics show that San Francisco has one telephone to every four persons, as has Los Angeles also, the latter city having slightly the better showing in this regard. San Francisco is one of seven world cities having over 100,000 telephones in use, and Los Angeles ranks ninth in point of total phones installed.

STANDARDIZING MENTAL OPERATIONS.

A new thought has been developed by R. W. Babson in a recent issue of the Journal of the Efficiency Society which contains much to commend itself to executives. Any man knows from his own experience that a large part of his day's work consists in passing judgment on questions referred to him for decision.

All these things are "matters of judgment." In other words, each case is handled as an individual problem and decided on its own particular merits. "All things considered, it seems best under the circumstances"—is the usual basis of the verdict.

Mr. Babson questions whether a great deal of energy is wasted by not having policies more fully standardized and then sticking to these policies more religiously. Suppose that a manager has a definite one-price policy; his standard decision when shading was proposed would be "No." If his factory policy were to fill all orders in rotation by date of receipt, his position with respect to a rush order would also be "No." Those matters, therefore, would be cleaned up with practically no mental work at all.

The mental work would have been previously performed in planning the standard policies. This of course would have to be done with care and deliberation. When constructing a standard—in whatever line—neither time nor effort are spared to get the most perfect product possible.

The obvious objection to standardizing policies is that you may sometimes miss a profit or incur a loss. The author is inclined to believe, however, that in many cases we would be more scared than hurt. A prospective profit or loss always looks bigger than an invisible overhead expense. A hundred-dollar sale goes off like a bomb, but a hundred-dollar expenditure of a good man's energy is almost inaudible to the average ear.

This much is certain: There is a multitude of high-priced men whose chief activity is to answer over and over again practically the same questions. We would gain in the long run by answering these questions once for all, to the very best of our ability, and then take the losses if any, for the sake of the immense saving in nervous energy.

Do not overlook the opposite danger of getting in a rut or "rubber-stamp" management. An out-grown, ill-advised standard is worse than no standard at all. Moreover, all standards, particularly those of policy, must be continually studied and improved; it is this bigger job which should engage the best ability that money can command. His contention is that we can't afford to let such men wear themselves out deciding each particular case on its own petty merits. Let them keep in touch with detail, if necessary, but have this detail so standardized that it can be passed upon with the minimum of mental effort.

One secret of personally managing a large volume of work in a short time is to have at your command a set of standard decisions,—and the courage to apply them, and lack of courage is generally where the rub comes.

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E. B. STRONG,
President and General Manager.

Sworn to and subscribed before me this 22nd day of September, 1913.
(Seal.)

CHARLES EDELMAN,
Notary Public in and for the City and County of San Francisco, State of California.
(My commission expires April 9, 1914.)

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Inductive Interference

Of all the complex subjects with which the electrical engineer is confronted the inductive interference between wires used for communication and those used for power transmission is perhaps the most perplexing. Each year the meshes of the great network of wires with which the country is covered become smaller and the interference becomes greater, so that the demand for the elimination of this trouble is becoming more and more insistent. Added to the engineering complications which must be unravelled, are the legal tangles in which this skein of wires has become involved. The telephone company, as the party physically injured, brings suit against the power company, as the aggressor, and the lawyer usurps a function which rightfully belongs to the engineer, but which the latter has not yet been able to fulfill.

From the legal standpoint the defense usually lies with the power company, which is maintaining the nuisance. Though no binding decision has yet been made, the trend of previous judgments show that the line first rightfully in position is entitled to protection against interference by induction from the one subsequently in position. The injured company can usually get an injunction for its protection and the defendant has been adjudged liable for damages unless the wires were moved to obviate interference. On the other hand priority of occupation does not imply exclusiveness of privilege and the principle of the greatest good to the greatest number gives certain rights to the power company.

With regards to traction companies the situation is somewhat different as many states grant them superior rights because electric railway service is considered as an "ordinary use" of a street, whereas a telephone company is usually bound by its charter to yield subservience to a dominant use of the street. A majority of decisions has required telephone companies to devise some means of protecting their lines and so the problem again rests with the engineer.

This Gordian knot cannot be cut by the sword of justice. The mathematician and the scientist by patient investigation must continue in their search through the labyrinth until the secret is revealed and the engineer provided with the needed tools. This fact was recognized last year by the California Railroad Commission whose committee reports progress elsewhere in these columns. Most exhaustive tests are being made and valuable data is being accumulated which should form the basis for co-operation rather than competition between the conflicting interests.

Ignorance or Carelessness

When a street-car or railway accident occurs and lives are lost, condemnation leaps unguarded from a myriad lips. "Corporations are careless, or the motorman or engine-driver is to blame." And through ignorance on the part of those who condemn, such popular, though frequently erroneous verdicts, are allowed to pass unchallenged.

But be the condemned corporation ever so careful o life and vigilance of the driver or motorman unequalled, accidents may still occur. The contributing causes, some avoidable, are many, but are outside the jurisdiction of those upon whom the public, in ignorance of the real facts, endeavor to fix the blame. It is not unusual, when an engine driver has "ignored" and run past signals which were against him, and in the consequent wreck has passed out, for the same public to express their "sympathy" short enough and terse—"Served him right!"

None but the man killed would have been able to tell us why the accident occurred. It is well then that we give the "cause" a really sympathetic and intelligent consideration before we hastily condemn. A trespassing pedestrian walking along the tracks may have persisted in staying until the last moment before making for the devil-strip. The attention of the engine driver is riveted upon him—a life is in danger. The same steam though, which sends out the urgent warning obscures his view of the signal and when it is too late, he knows that the signal was against him. The crash, with loss of life and property follows. He saved another, himself he cannot save, but we, at least, can withhold blame.

There are many ways in which the cab windows can become obscured and so prevent the prompt or proper reading of signals. Certainly the cab window might be lowered, but if the night is cold or the speed high it is unnecessary to point out that the eye, even with its wonderfully protective mechanism, could not keep from watering and so soon prevent seeing altogether.

A locomotive is by no means automatic in operation; there is considerable driving to be done and unexpected difficulties to be overcome. Then again, to view a signal from the ground is simple, but it is a far different matter to read the same signal from a locomotive, speeding, swaying, jolting and jarring along at high speed; the shimmer of the heat also contributing to the attendant blurring of everything seen. A distant tin can, carelessly flung from a passing train, catches the rays of sunlight and flashes them back with blinding effect into the eyes. Everyone has experienced this effect of glare, which also occurs when sunlight is reflected from snow, sheets of water, and even from banks of green foliage. Where glare, with its attendant depression of the visual function is preventable, then early and urgent steps should be taken to eliminate such causes. Motormen of street cars, undoubtedly experience great annoyance from automobile headlights. Those at present in general use, or abuse, are a menace to pedestrians as well as to the street car passenger and early legislation should be sought which will remedy this evil. Light can and should be controlled and the inventor of a headlight which will eliminate the present objectionable feature of glare will find an aroused public eager to aid him in the successful marketing of his product, for unless glare is done away with, accidents will be of frequent occurrence. It is difficult to attach the blame where it belongs; certainly it does not belong to either the motorman or the street-car company although they are usually held to blame.

Other reasons for a more righteous judgment than that usually given might be advanced, but it is sufficient if we but bear in mind the thought that the men to whom when we travel, we must of necessity entrust our lives are but human, with limitations the same as we have, and when we are satisfied that everything has been done to insure public safety in travel and an accident still occurs, let us not in ignorance condemn, but rather pay tribute to those who risk and sometimes lose their lives in their attempt to satisfactorily serve all.

An aroused interest in the affairs of others may permit us the easier to anticipate our own opportunity.

Watch and Serve

The electrical industry is so often the harbinger of progress in other industries, its success so often coexistent with theirs, that progress along any line should be carefully watched by manufacturers, jobbers, and others, that no opportunity be overlooked.

We all feel that we know just what opportunity is, but were we to realize that opportunity consists in the improvement of human service, conditions, or environment, it would be easier far to grasp it.

A long suffering public in a northern town asked for heated street cars during the winter-time, and a penurious manager, after saying, "You can't have 'em," or something equally abrupt, produced reams of figures to show that you couldn't do it anyhow. And so the public rode cold, and that was their attitude toward the "manager" who was soon "frozen out." But the public had it in for the company.

Then came one, young in years, inexperienced, but willing to serve, though at the same time he had an eye to economies. But to grab, is not to gain, and to withhold all is to lose all. He did not ride in a heated electric, but on the poor man's automobile—the street car—and he too, chilled to the marrow, objected.

"Why," he asked of his mechanics, "do you carelessly dissipate heat around the city which might be made to contribute to creature comfort? Strike off from beneath our cars these old-time rheostats and build for me new resistances to be installed within the cars where the heat they generate will contribute to the public good." And they did so, and the people rose up and called him blessed, and did laud his company. Moreover he made a fortune also from his invention, for he had grasped opportunity.

So will all obstacles vanish from the pathway of the man who would serve. Opportunity is the answer to need, and exists therefore wherever there is a need, actual or anticipated, which may be met. Do you seek opportunity? It is yours, up to the limit of your capabilities.

Do not call the other fellow lucky or more fortunate if he, watching the progress of other industries, grasps an opportunity which you, perhaps more closely associated with it, may have overlooked.

Making it easier or more pleasant for others, no matter what their occupation, will find new outlets for your wares.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

E. W. Rockafellow, general sales manager for the Western Electric Company, is at San Francisco.

Miles F. Steel of the Benjamin Electric Company, San Francisco, is on a business trip through Oregon.

H. Lewis of the Seger Electric Company, Fresno, Cal., spent a few days during the week in San Francisco.

Robert H. Parker, manager of the Butte office of the General Electric Company, spent a few days in Salt Lake City recently.

R. Reid, having completed his work as electrical engineer for the Waiahole Water Company of Hawaii, is now at San Francisco.

F. F. Skeel, western manager of the Crouse-Hinds Company, spent the past week at San Francisco and is now at Los Angeles.

W. W. Briggs, manager of the Great Western Power Company, San Francisco, spent the week on business in the Sacramento Valley.

Harry B. Lynch, manager of the Glendale Lighting Department, has been appointed manager of the proposed lighting plant of Burbank, Cal.

A. J. Seizer of the Adams Bagnall Electric Company, Cleveland, Ohio, is making a tour of the Pacific Coast and spent the week in San Francisco.

W. F. Neiman, sales manager of the Great Western Power Company, San Francisco, has left for a two weeks' business trip to Portland and the northwest country.

H. B. Squires of the H. B. Squires Company, San Francisco, returned the latter part of the week from a several days' business trip to Los Angeles and Southern California.

M. H. Gregg, formerly division manager for the United Light & Power Company at Oakland, Cal., is now division manager for the Sierra & San Francisco Power Company at Salinas, Cal.

A. V. Olson, of Pass & Seymour's San Francisco office, left the first of the week on a business trip to Portland, Seattle and other points in the northwest. He expects to be gone two months.

L. R. Jorgenson, engineer with F. G. Baum & Company, of San Francisco, is making a trip to Juneau, Alaska, to inspect the Jorgensen arched type dam being installed by the Alaska-Gastineau Mining Company.

P. B. Hyde of the Edison Storage Battery Company, San Francisco, is the proud possessor of a new son and heir. Reports indicate Hyde Jr. is doing well and on the road to join the ranks of electrical engineers.

W. L. Emmett, consulting engineer with the General Electric Company, and **W. J. Davis Jr.,** Pacific Coast engineer with the company, are in the Pacific Northwest, whence Mr. Emmett will return to Schenectady.

A. L. Appleton of the Appleton Electric Company left Chicago last week for a business trip to the Pacific Coast. He went by way of Vancouver, B. C., and is expected to arrive at San Francisco this week.

Paul B. Wilson, formerly district agent for the San Joaquin Light & Power Company at Alpaugh has been appointed district agent at Paso Robles, Cal., and **F. A. Easton** has been appointed district agent at Selma.

F. B. Clapp, who has been specializing on the sale of electric railway apparatus for the San Francisco office of the General Electric Company, will take charge of the construction of the suburban electrification of the Victorian Railways at Melbourne, Australia.

B. S. Josselyn, ex-president of the Portland Railway, Light & Power Company, was the guest of honor at an informal luncheon at the Imperial Hotel recently, at which members of the Jovian Order were the hosts. Mr. Josselyn, who leaves Portland next week for New York to engage in public utility work, was the recipient of a book containing a set of resolutions recently adopted by the Jovians, setting forth the regret of Mr. Josselyn's associates at his departure.

James Campbell, a St. Louis capitalist, who is among the heaviest stockholders in the Utah Power & Light Company, is in Salt Lake inspecting the interests of the company in Utah and Idaho. During his stay in Utah Mr. Campbell will be accompanied to the various interests of the Utah Power & Light Company by **P. B. Sawyer,** general manager of the company. Mr. Campbell said there was no connection with his visit and the proposed extensions of territory covered by the company. He said his trip was merely one of personal inspection of his investments and had nothing to do with the operations of the corporation.

H. E. Grant has resigned as sales manager with the San Francisco office of the Holophane Works to join the editorial staff of the Journal of Electricity, Power & Gas. Mr. Grant's electrical experience began in the British Isles in 1899 with the Isle of Thanet Light and Railway Company. After considerable construction experience he went to Canada and upon the formation of the Province of Alberta was chosen by Premier Rutherford to organize the new Department of Agriculture, later acting as first statistician. In 1907 he joined the British Columbia Electric Railway Company at Vancouver, remaining for a year in the engineering department and then resigning to join the commercial department as sales manager. Mr. Grant did effective work in this capacity for four years, when he resigned to take up illuminating engineering work with the Holophane Works for nearly two years. It is thus seen that Mr. Grant brings a wealth of practical experience to his new work which should be reflected in the pages of this journal. He is a member of the National Electric Light Association, being an active worker on the Committee for the Organization of the Industry, of the Illuminating Engineering Society and of the Jovian Order.

IN MEMORIAM.

FRANCIS VALENTINE TOLDERVY LEE.

Born—Winchester, New Hampshire, England, August 28, 1870.

Died—Victoria, B. C., Canada, August 17, 1913.

Son of Francis V. T. Lee of Shropshire, England, an Officer of The Queen's Own Light Infantry.

His school and college training was as follows:

Manchester Grammar School, Manchester, England.

College Communal, Boulogne, s.m., France.

Leland Stanford, Jr., University, California, was graduated 1897, B. A. in Electrical Engineering.

Assistant to Dr. F. A. C. Perrine, Prof. of Elec. Eng., 1893-1897.

Came to Sherbrooke, Canada, in 1887, and for the greater part of three years was in the service of the Canadian Pacific Railroad, as private secretary to the Division Superintendent. He resigned from railroad service to supplement that part of his school training that was taken abroad, with a more adequate technical training in this country. Shortly after his resignation he went to Victoria, B. C., and thence home to England on a trip, after which he returned to New York, where he entered the Manhattan Electric Company in order to gain experience that would enable him to test his liking for the specialty of electrical engineering. Here he came in contact with the late Dr. F. A. C. Perrine, and there resulted one of the great friendships of his life. Often a preceptor exercises a very great influence on the life and personality of a student, particularly is this true when they come as intimately in contact as did Dr. Perrine and Mr. Lee, who then was working his way through college, and assisted Dr. Perrine as secretary and general laboratory assistant. So

strong was Dr. Perrine's influence that many of Mr. Lee's old friends have often remarked on the little personal mannerisms, if they may be so called, that each acquired, unconsciously, doubtless, from the other.

Shortly after being graduated from the University he was appointed Assistant Engineer to John Martin, agent for the Pacific Coast Department of the Stanley Electric Manufacturing Company. He rose rapidly in this service, being appointed Engineer, January, 1898; Manager of the office in June, 1899, and a year later was made Vice President and General Manager of John Martin & Co., Electrical Engineers and Contractors, also District Pacific Coast Manager for the Stanley Electric Manufacturing Company, and many other Eastern manufacturers. During the above period there came under his direct supervision the erection of many of the earlier lighting and power plants that later were absorbed by the Bay Counties Power Company and the Pacific Electric Railway Company, for example.

Early in 1906 he severed his connection with John Martin & Co., but followed Mr. Martin's interests into the Pacific Gas & Electric Company where he was made Assistant to the President. As such he was generally responsible for the construction and operation of the hydro-electric developments of that company.

About three years ago he resigned from the service of the Pacific Gas & Electric Company to rest and to enjoy his well-earned competence. His last three years were play years, enjoyed fully in the close companionship of his wife and two daughters, with whom he spent these years abroad, in his old home in England, and traveling on the Continent. They returned a few months ago to Victoria, where he had intended to make his future residence.

On September 27, 1899, he was married to Edith K. Bonnallie of Sherbrooke, Quebec, Canada, who, with his two daughters, Ruth and Margaret, survives him.

Mr Lee died before much of his work, particularly that of the last seven years, had time to demonstrate its real worth. In all his business life his relations with the really big men with whom he worked, brought a mutual confidence and personal regard that in many cases amounted to a real affection. For the others, those of less caliber, he had a good-humored tolerance, although at times his path was made exceedingly rough.

His absolute faith in the kindliness of human nature was wonderful, for he had many rebuffs, but they never embittered him, and by habit he refused to believe any harm or evil of anyone until he had absolute proof of it. Many times he was heard to say "'They say', is a liar," and this he lived up to. Those who came intimately in contact with him knew the absolute integrity, the uprightness and the sweet disposition of him, and are thankful for the memory of him they cherish, and for the last three years he enjoyed so much.

His personal tastes were simple. The Fine Arts, of which he had a cultured enjoyment, appealed to him strongly. His reading covered a wide range, and having leisure he enjoyed his fine reference library to the full. A list of the works therein is an index of his versatility, and it a revelation even to his intimates.

At the time of his death he was a member of the American Society of Mechanical Engineers, the Institution of Electrical Engineers, the American Institute of Electrical Engineers, the American Gas Institute, the American Society of Civil Engineers, and the American Electro-Chemical Society. Also he was a member of Occidental Lodge No. 22, F. and A. M., of California Chapter, R. A. M., and a Knight Templar, member of Golden Gate Commandery, K. T., all of San Francisco.

A. H. BABCOCK.

Electrical Development and Jovian League of San Francisco.

At the regular weekly meeting held Tuesday the members were addressed by Mr. Percy V. Long, City Attorney. It was intended that Mayor James Rolph Jr. should be present, but owing to illness the Mayor could not be present, and Mr. Long appeared as his representative. The speaker took for his subject "Municipal Ownership," and dwelt in detail upon the municipal ownership of San Francisco's water supply, telling of what had been accomplished by the city in the undertaking and what was yet to be done.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The California & Oregon Telegraph Company, with main offices in Susanville, and operating in Lassen and Modoc counties, has applied for authority to lease the Nevada, California & Oregon Telephone & Telegraph Company, which operates in Plumas, Lassen and Modoc counties.

At the final hearing in the commissioners inquiry into telephone rates at San Jose, the commission's assistant engineer, A. R. Kelly, submitted his valuation of the company's plant in San Jose. A comparison with the company's own valuation follows: Kelly's valuation—San Jose only, $772,000; San Jose district, $823,000; company's valuation, $848,000 and $904,000 respectively.

The railroad commission issued a supplemental order granting authority to the Ojai Power Company to assume a note of $2500 in part payment for the properties of the Nordhoff Water Company.

A decision was rendered granting authority to the Midland Counties Public Service Corporation to purchase the franchises and properties of the Midland Counties Gas & Electric Company, the Paso Robles Water & Electric Company, and the Russel-Robison Water & Electric Company. The Midland Counties Public Service Corporation was also given authority to assume a bonded indebtedness of $821,000 of the underlying companies, and to issue $338,000 of bonds for additions and betterments.

A decision was rendered granting authority to the Pacific Gas & Electric Company to issue $7,000,000 of notes. The authorization enables the company to carry out its plan of financing as previously approved. The proceeds will be devoted largely to extensive hydroelectric development work.

The Pacific Telephone & Telegraph Company applied for authority to issue $3,000,000 of bonds. The company proposes to use approximately $1,850,000 to retire underlying bonds of the Sunset Telephone & Telegraph Company, and the balance for improvements in its system in San Francisco, Los Angeles, San Diego and Oakland.

A decision was rendered granting authority to the San Diego Consolidated Gas & Electric Company to issue $25,000 of bonds under a previous authorization.

NEWS OF OREGON RAILROAD COMMISSION.

The Oregon State Railroad Commission announces that within a few days it will fix standards for the measurement of quality, pressure and initial voltage of the public service companies in that state engaged in furnishing heat, light, water or power. It also will prescribe regulation for the examination and testing of the various products, in order to have accurate meters and appliances for measurement. It is planned to provide for an examination of all appliances and the commission will determine whether an appliance may be installed before it has been examined and found to be correct. It is probable that a reasonable fee will be charged for the testing, to be paid by the company affected. The commission also will establish fees to be paid by the consumer making complaint, who is to be reimbursed by the company affected if the appliance is found to be defective.

THE ELECTRICAL CONTRACTORS' DEPARTMENT

CHANGES IN 1913 EDITION OF THE NATIONAL ELECTRICAL CODE.

BY F. D. WEBER.[1]

Changes made in the "National Electrical Code," Edition 1913, referring to the 1911 Edition as a basis of reference.

Added—Explanation on inside of cover.

Class A—Generators, Motors, Switchboards, Etc.

1. Generators.
   c—Third paragraph changed.
   d—Changed.
3. Switchboards.
   b—Changed.
   e—New, added.
4. Resistance Boxes and Equalizers—New Heading.
   b—New paragraph added.
   c—Changed.
8. —Motors.
   a—Second paragraph reworded.
   c—First paragraph reworded.
   c—Third and fifth paragraphs changed.
   e—Reworded.
   f—Reworded.
   f—Fourth paragraph added new.
   k—New added.

Class B—Outside Work.

Introductory paragraph—new and added.

12. Wires—Ground Return Wires.
    m—Omitted.
14. Transformers.
    a—Changed.
    b—Omitted.
15. Grounding Low—Potential Circuits.
    a—Changed.
    a—3. Fine print note omitted.
    b—Changed.
    b—3. Fine print note omitted.
    g—Changed—nearly all.

Class C—Inside Work.

Introductory paragraph new and added.

16. Wires, b—First paragraph changed.
17. Underground Conductors.
    d—Reworded.
18. Table of Allowable Carrying Capacities of Wires.
    Third paragraph changed.
    Third paragraph fine print note omitted.

CONSTANT-CURRENT SYSTEMS.

20. Wires.
    c—Reworded.

CONSTANT POTENTIAL SYSTEMS.

23. Automatic cut-outs.
    a—Added.
    d—Changed.
    e—Second paragraph changed.
24. Switches.
    a—Added to.
    b—Changed.
    d—Changed.

LOW POTENTIAL SYSTEM.

26. Wires.
    g—Added to, note omitted.
    h—Third paragraph omitted.
26. Wires.
    For moulding work (wooden and metal).
    k—Added to.
    l—Changed.
26. Wires.
    o—Third paragraph, changed wording.
    p—Third paragraph changed.
    For concealed "knob and tube" work.
    q—Added to.
    u—Changed.
27. Armored Cables.
    b—Third paragraph and fourth paragraph changed.
    c—Second paragraph fine print note, this paragraph, now required by code.
    Fifth paragraph fine print note added.
    d—Changed.
28. Interior Conduits, changed wording.
    b—Third paragraph added.
    d—First paragraph, part added. Third paragraph added. Fourth paragraph reworded.
    f—Second paragraph fine print note under this made part of code requirements. Last paragraph fine print note added.
29. Metal Mouldings.
    b—Second paragraph and third paragraph changed.
30. Fixtures.
    a—Third paragraph changed.
32. Flexible cord.
    e—Changed and added to.
34. Mercury vapor lamps, title changed.
36. Transformers. Oil transformers.
    a—Wording changed.
    Air cooled transformers: Fine print note made part of code requirements.
37. Decorative Lighting Systems, changed.
38. Theatre and moving picture establishments, wiring—wording changed.
    d—Footlights second paragraph, changed.
    e—Border and proscenium side lights, changed.
    i—Control for stage flues. Third paragraph changed.
    t—Auditorium. (1) changed.
    u—Moving picture equipments. Title changed. (2) changed. (6) changed.
    v—Added (new rules).
39. Outline Lighting. All rewritten.
    l—Changed
40. Car wiring and equipment of cars. Not included in this outline.
44. Wires.
    b—Wording changed.
45. Transformers, note omitted.
    Fine print note changed.
    c—Changed.

Class D—Fittings, Materials and Details of Construction.

50. Rubber-covered wire.
    b—Fine print note now required by code. Lead covered wires and cables for interior work only. added to.
54. Flexible Cord.
    Note changed under heading.
    c to l—Changed.
55. Fixture Wire.
    Note changed under heading.
57. Armored cables and cord changed.

[1] Electrical Inspector Underwriters' Equitable Rating Bureau, Portland, Oregon.

58. Interior Conduits.
Title changed.
Note under heading changed, nearly all rewritten and added to.
59. Outlet Junction and Flush Switch Boxes.
e—Changed.
g—Changed.
62. Sizes.
Fine print note omitted.
65. Switches.
j—Marking changed.
k—Spacings and dimensions changed.
s—Test changed.
67. Link-Fuse Cut-outs.
d—Omitted.
Explanatory note omitted.
68. Fuses.
f—Terminals.
Table changed to new location.
g—Dimensions table omitted.
i—Marking, dimension table inserted.
69. Tablet and Panel Boards, heading changed.
70. Cabinets.
a—Changed.
Third paragraph rewritten and changed.
72. Sockets.
a—Marking. Title changed and paragraph rewritten and changed.
d—Ratings. Title changed and paragraph rewritten.
e—Second paragraph. Last part of fine print note omitted.
g—Changed.
k—Changed.
m—Putting together. Title changed also paragraph rewritten.
n—Test, changed.
p—Sockets of insulating material. Second paragraph added.
76. Insulating Joints. Rewritten.
77. Fixtures.
Explanatory note changed.
g—Added, new.
78. Rheostats, Resistance Boxes and Equalizers.
c—Connections, changed. Fine print note omitted, changed and added.
h—Tests. Third paragraph changed.
79. Auto-Starters.
Explanatory fine print note added.
b—Connectins, changed.
e—Tests, changed.
81. Transformers. Rewritten and rearranged.

Class E—Miscellaneous.

88. Signaling Systems.
e—Changed.
88. Insulators, resistance. Rewritten.
89. Soldering Fluid. Omitted.

Class F—Marine Work.

91. Wires.
j—Second paragraph changed.
102. Interior Conduits.
f—Changed.

CALIFORNIA ELECTRICAL CONTRACTORS' ASSOCIATION

The offices of the California Electrical Contractors' Association have been moved to the Rialto Building, San Francisco, where Secretary W. S. Handbridge will hereafter make his headquarters. Good progress is being made in the project to establish an exhibit of wiring devices in connection with the association's offices.

JOINT POLE CONSTRUCTION, PORTLAND, OREGON.

On September 26, 1913, the representatives of the various public utilities companies who are interested in "Joint Pole Occupancy," and the Joint Pole Committee of the Oregon Society of Engineers, met with Mr. Will H. Daly, Commissioner of Public Utilities of the City of Portland, for the purpose of considering the matter of the use of joint poles throughout the city. The city council having passed ordinance No. 27,786, gave Mr. Daly power to call this meeting. At the meeting it was decided to form a temporary organization of the members present, and at the first meeting form an organization electing a chairman and secretary. This committee to report at the end of sixty days to Mr. Daly, with a form of Joint Pole Contract and Specification, which would be agreeable to all parties interested.

POWER PERMIT FOR SOUTHERN CALIFORNIA EDISON COMPANY.

Secretary Houston has just granted a permit to the Southern California Edison Company for the development of additional electrical power on the Kern national forest. This company operates seven hydroelectric plants, one of which is on the Kern and five others on the Angeles national forest. The six plants on the national forests are capable of developing 37,000 horsepower, although there is not sufficient power in the streams to develop such an amount of power continuously. The company has installed, therefore, a number of auxiliary steam plants, which have a total capacity of about 54,000 horsepower.

The four projects mentioned in the permit are designated by the company as Kern River plants 2, 3, 4 and 5. It is expected that plant No. 3 will be the first to be put into operation, with 4, 5 and 2 following in the order given as the demands of the market increase. It is stated by the company that expensive dams will not be needed, but that the construction of some of the conduits will be difficult and will require considerable time. Because of this, and also because of the large investment required and the large amount of power that is involved in the development, the department of agriculture allows a period of almost 12 years before the plants will have to be in complete operation.

According to the estimates of the government's engineers the four new projects of the company will be able to supply almost 33,000 horsepower, except for a few days in a period of five years. Through the use of its steam auxiliary plants, however, the company will be able to obtain considerably more than that amount, and it is planned to install machinery which will have a total capacity of more than 80,000 horsepower. This will be transmitted at high tension by means of poles and steel towers over a maximum distance of about 155 miles from the plants to the city of Los Angeles.

NEW CATALOGUES.

The Dnucan Electric Manufacturing Company has issued Bulletin No. 28 on the Duncan Switchboard Watthour Meters for a.c. and d.c service. This bulletin contains much matter that should interest meter men, particularly on the subject of shunted types.

The Wagner Electric & Manufacturing Company, St. Louis, Mo., are distributing Bulletin 101, dealing with their various types of single-phase motors, and Bulletin 102, descriptive of their polyphase motors. These bulletins, each 15 pages, are profusely illustrated and contain much matter of interest.

The history of this line of motors is referred to and their construction and operating characteristics described in detail. Many interesting curves are given, bearing upon torque, speed, efficiency, power factor, etc. These bulletins should prove of considerable value to all interested in the installation of alternating current motors.

THE PASSING OF THE MILE AS A UNIT OF ELECTRICAL MEASUREMENT.

In the infancy of the electrical industry many units in general practice were naturally used to signify various quantities and conditions of the new form of energy. Many of the available units were not well suited to electrical measurements because electricity and the various industries to which it has given rise, have developed standards which are entirely different from all precedents. It was therefore necessary to devise new units in order to insure a better understanding of the actual conditions and to provide for greater efficiency in the long run.

It is undoubtedly because of this early necessity for breaking away from old traditions that the electrical engineering profession has always been among the first to adopt new methods and new units. A pertinent example is the invention and use of the circular mil, which has eliminated π from computations of the cross-sectional area of wires and cables. It now seems probable that the practically universal unit of length, the mile, is to be superseded by a standard of one thousand feet. Tables on costs and prices of wires and cables have been figured on this new basis for some time. Conductor resistance, particularly in the case of copper wire, is now commonly tabulated in ohms per thousand feet instead of in ohms per mile.

It is interesting to note in this connection that the Simplex Wire & Cable Company has recently abandoned the use of one mile as a unit of length for all factory measurements. This applies not only to conductor resistance but to insulation resistance (megohms per 1000 feet), capacity (microfarads per 1000 feet), and inductance (henrys per 1000 feet). By adopting one thousand feet as the unit of length for all electrical measurements at the Simplex factory and thus eliminating (from about a thousand calculations daily) the factor, 5280, an immense amount of figuring is avoided. In comparing the new standard with the mile, a close approximation for general use—involving an error of less than 6 per cent—is to multiply or divide the mile standards by five. For insulation resistance calculations, at least, a 6 per cent error is well within the limits of manufacture. In fact, as the change does not seriously conflict with former standards and is surely along the lines of simplicity and efficiency, there is apparently nothing but inertia to prevent its general acceptance.

OREGON POWER PROBLEM.

The following act has been filed with the secretary of state of Oregon relating to the Columbia River Power Project, providing for a detailed survey, investigation, co-operation and providing money therefor.

AN ACT.

Be It Enacted by the People of the State of Oregon:

Section 1. In order that the public interest in certain undeveloped water power, may be protected, and that detailed information as to cost of developing, transmitting and distributing such power in comparison with the cost of producing power from other agencies, may be definitely known as a basis for the adoption of some comprehensive policy with reference to the development of our water power resources, the legislative committee to consist of two members of the senate, to be appointed by the president, and two members of the house to be appointed by the speaker, who, when appointed, together with the state engineer, is hereby authorized on behalf of the state of Oregon, to enter into such contracts or agreements, with any officer or agent of the state of Washington, as may be found desirable to more economically carry out the provisions of this act. Such committee is also authorized to enter into contract with any federal department or bureau, if found desirable to more economically or efficiently carry out the provisions of this act.

Section 2. It shall be the duty of the committee named in Section 1 to prepare detailed plans, specifications, and estimates of cost for the maximum economical development of water power in the Columbia River, near The Dalles, at what is known as Five Mile Rapids. All available information relating to the project shall be collected and carefully checked as to its accuracy, sufficient borings shall be made at the proposed dam site and along the canal to ascertain the character of foundations, and detailed plans shall be prepared as a basis for estimating the cost. The committee shall prepare detailed estimates of cost, under certain assumed conditions, of transmitting such power to various points in Oregon and Washington, including cost of distribution to consumers. The committee shall also estimate the cost of producing power from other sources than water power, in order that the saving in cost, if any, may be apparent, and shall gather such other facts and information as may be of value to the public in the framing of some comprehensive water power policy.

Section 3. As soon as practicable after the completion of such surveys and investigations, the committee shall prepare, or cause to be prepared, a report setting forth the plans, specifications, and estimated cost of construction, maintenance and operation of such projects, together with any other information tending to show the feasibility of the same, and may, in its discretion, have such report printed in pamphlet form for gratuitous distribution to those interested. Copies of all completed maps, plans, specifications, estimates and reports secured or prepared in connection with any such investigation shall be kept on file in the office of the committee at all times, and shall be open for public inspection during business hours.

Section 4. There is hereby appropriated out of any money in the general fund of the state treasury, the sum of $15,000 to carry out the provisions of this act, which sum is to be expended on vouchers approved by the committee in the same manner as salaries of state officials are paid. The committee is hereby authorized to employ assistance, and to purchase material and supplies necessary in carrying out the provisions of this act.

TRADE NOTES.

Western Dry Battery Company, Seattle, has doubled the capacity of its factory by installing a new tamping machine.

American Woodpipe Company of Tacoma has finished the steam pipe casing for the Northwestern Electric Company's plant at Portland.

The Benjamin Electric Company, San Francisco, reports the arrival of the first shipment of their new model A Fordorn and model F battery horn for automobiles.

Herbert C. Moss, illuminating engineer, Seattle, has the contract for designing the electrical equipment in the cold and warm storage warehouse of the Seattle port commission.

Chas. C. Moore & Company, San Francisco are furnishing a "Smith-Vaile" 13 by 12 triplex pump for the city of Healdsburg waterworks system and a 10 by 12 pump of the same type for the city of Burbank.

Through the courtesy of the Board of Fire Underwriters of the Pacific Coast the 1913 edition of the "National Electric Code" has been mailed to all its members by the Electrical Development and Jovian League of San Francisco.

The Lushington Electric Company, Seattle, is wiring at 1209 Occidental avenue, for theatrical purposes. Semi-indirect lights will be used for the art glass effect. The company is also remodeling the lights in Sherman, Clay & Company building at Third and Pine streets.

NEWS NOTES

FINANCIAL.

BALBOA, CAL.—An election has been called for October 7th to vote an additional bonded indebtedness of $25,000 to pay expenses of putting in an 8 in. water main from the reservoir to Balboa.

SAN FRANCISCO, CAL.—The San Diego Consolidated Gas & Electric Company has applied to the railroad commission for authority to issue bonds of the face value of $25,000 under a previous authorization.

SAN FRANCISCO, CAL.—The Signal Hill Water Company of Long Beach has applied to the railroad commission for authority to issue 495 shares of capital stock. The stock was sold for non-payment of assessment, and the parties now desire to redeem it upon the payment of the assessment.

SAN FRANCISCO, CAL.—The San Francisco Gas & Electric Company, a subsidiary of the Pacific Gas & Electric Company, has drawn by lot and will retire $100,000 face value of iits $7,250,000 20-year 4½ per cent general mortgage bonds at 105 and accrued interest, November 1.

SAN FRANCISCO, CAL.—The entire issue of $330,000 bonds of the Stockton Gas & Electric Company have been called for January 1, 1914, at 105 and interest; but the Mercantile Trust Company of San Francisco has announced that it will pay that price for all bonds presented between now and that date.

SAN FRANCISCO, CAL.—The Sonoma Valley Water, Light & Power Company has applied to the railroad commission for authority to issue $30,000 in bonds, the proceeds to be used to pay off existing indebtedness and to make extensions to the system. The company serves the town of El Verano and vicinity.

ABERDEEN, WASH.—The following is a report on the various water and light projects: Project A—32-in. pipe line up Wishkah Valley, $350,000. Project B—32 in. pipe line up the Wynooche Valley, for gravity system, $780,000. Project C—32 in. pipe line up the Wynoochee River 10 miles and pumping station, $186,500. The second proposal is for a direct gravity system from the specified point on the Wynooche River to Aberdeen. Project C calls for a pumping plant on the Wynooche River. The report was referred to the water commission. The cost of the dam is estimated at $226,000, including penstock and machinery. Transmission line to pump house at $50,000.

ILLUMINATION.

GLADSTONE, ORE.—The city council has ordered the purchase of 15 bracket lamps.

COMPTON, CAL.—Sealed bids will be received up to October 7th for the purchase of an electric lighting and power franchise in Compton.

SACRAMENTO, CAL.—Bids have been asked by the city clerk for electroliers to be erected at Tenth and K streets, in accordance with a lighting district formed to take in the northwest corner.

NELSON, B. C.—The city council of Nelson has determined upon the purchase of a gas plant to cost $140,000. The council figures that it has made a good investment and that the plant will pay for itself.

NEW WESTMINSTER, B. C.—A by-law has been introduced at the city council appropriating $150,000 to purchase the plant of the local gas company, which is held under a 60 day option at that figure.

RAYMOND, WASH.—H. W. Urquhart of Chehalis and John Stewart of Seattle have made application to the city council for a franchise to construct and operate a gas plant. It is thought that the plant will require the immediate expenditure of $75,000.

LEWISTON, IDAHO.—William A. Baehr of Chicago announces plans to start work immediately on extensions and improvements that will cost in excess of $25,000 of the Great Falls Gas Company. The directors of the company are William A. Baehr of Chicago, Geo. H. Stanton of Great Falls, E. A. Potter, H. L. Hanley and T. J. Lucas of Chicago.

TACOMA, WASH.—The commercial section of the Tacoma municipal lighting department has offered to the city of Puyallup a 1-cent rate on power as against a 3-cent rate offered by Stone & Webster representatives. In this way a delay of two weeks was gained by the department in which to submit detailed estimates looking to the use of Tacoma power

BAKER, ORE.—Work has been started on the municipal lighting plant. The plant will cost about $25,000 and water from the city's system will be impounded for the motive power. It is planned to generate 1700 horsepower when the plant is complete. The work of construction will be directed by L. C. Standard of the firm of Standard & Richardson of Portland, who drew the plans.

LONG BEACH, CAL.—Ordinances have been adopted by the city council of Long Beach, ordering that systems of ornamental lighting standards equipped for use be constructed in American avenue, between Ocean avenue and Anaheim street; also along both sides of Broadway, between Alamitos avenue and Water street, in accordance with specifications and plans and ordinance requirements.

SOUTH VANCOUVER, B. C.—Reports on the construction of a municipal electric lighting plant and a municipal gas plant have been prepared for the city. The council has endorsed the report of Messrs. Coates & Hancock appointed to investigate the erection of a municipal gas plant which they say would cost $325,000. A suitable building would cost $250,000 while the laying of mains make up the aggregate of $325,000. The lowest cost to the consumer according to the engineers, for gas sold from such a plant would be $1.16 a thousand feet.

SEATTLE, WASH.—J. D. Ross, superintendent of lighting, Oliver T. Erickson, of the utilities committee of the city council, and Austin E. Griffiths, of the judiciary committee, Seattle, have been put on a committee to recommend a plan to either connect with Tacoma to take its surplus current, or to build a portion of the steam plant for which plans have been made. This part of the plant is to be built from the earnings of the existing plant until bonds are sold. It is expected that the gross earnings of the city lighting plant for the year will aggregate $1,074,500.

TRANSPORTATION.

PORTLAND, ORE.—Residents of the Mount Scott District have filed petitions requesting that the Portland Railway, Light & Power Company be compelled to extend a line to the cemetery.

VISALIA, CAL.—Sealed bids will be received by the clerk of the board of trustees up to October 5, 1913, for the sale of a 50-year franchise applied for by the Big Four Electric Railway Company.

RED LODGE, MONT.—A special committee of the Commercial Club voted to incorporate for an electric line to con-

nect Bear Creek coal fields and town of Washoe, and Bear Creek with Red Lodge; $100,000 in stock will be raised.

HELENA, MONT.—John D. Ryan, president of the Montana Reservoir & Irrigation Company, states that he will subscribe $50,000 toward the construction of interurban line to Hauser lake, providing citizens of Helena will raise additional amount to complete project.

BOISE, IDAHO.—The Idaho Traction Company has completed the installation of a 750-kw. motor-generator set for supplying direct current for the operation of their street railway system. With this additional transformer capacity available, the company will have provided for all present demands and a reserve for several years to come.

VANCOUVER, B. C.—It has been officially announced that arrangements are nearing completion for ordering four electric locomotives at an approximate cost of $75,000. Each locomotive is to be used on the Castlegar to Rossland line of the Canadian Pacific railroad. The electrification of this division is expected to overcome the difficulties met with now, by the unusual heavy grades and also a reduction in running time.

LOS ANGELES, CAL.—The board of public works has unanimously recommended to the city council that the Pacific Electric Railway Company be granted a 40-year franchise for its proposed elevated structure from the rear of the main street station to connect with the new San Pedro street line. The elevated railway will cost, together with right of way, close to $500,000. President Shoup of the Pacific Electric, states that steel contracts will be let as soon as franchises are absolutely assured.

FRESNO, CAL.—Announcement is made at the offices of the Fresno, Hanford & Summit Lake Railroad Company that bonds aggregating more than $200,000 have been voluntarily pledged by supporters of the interurban road and that construction on the first unit from this city to Selma will be started just as soon as material could be secured from the East. L. H. Jones, an engineer in whose hands now rests the management of the road, is at present in San Francisco securing prices on poles and ties for the line. The indebtedness of the road under the former management has been paid out in preferred stock and a new mortgage issued, but this act will have to be formally sanctioned by the railroad commissioners. It is announced that with every purchase of bonds stock would be issued at the rate of $500 in stock with $1000 purchase of bonds.

TELEPHONE AND TELEGRAPH.

GLENDIVE, MONT.—J. C. Owens, Billings, district manager American Telephone & Telegraph Company, is considering the feasibility of building an extension to Sidney. He states that additional circuit will probably be built next year between Glendive and Billings.

CLIFTON, ARIZ.—R. E. Pilloud, district manager Mountain States Telephone Company, with headquarters at Deming, N. M., states that his company, is preparing for improvement campaign that will include the entire renovation of the system at Clifton, and that high quality lines will be built between Clifton and Morenci, and between Clifton and Duncan. The entire equipment of the present service at Clifton will be discarded and new equipment of the best quality installed.

FLAGSTAFF, ARIZ.—District Commercial Superintendent McPhee and District Plant Superintendent Messner of the Western Union Telegraph Company, have made arrangements for the expenditure of from $4000 to $7000 on offices at Flagstaff. A new and complete battery of special type dynamos will be installed, and the present equipment will be replaced by the latest type instruments, also the furnishings of the office are to be replaced. The installation of new equipment will begin in about three months.

TRANSMISSION.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company has begun the running of lines down through the White River valley to supply the homes of the district between Dwamish and Kent with electricity for light and power Most of the current will be used for lighting the farm buildings, water supply pumps and general utility motors on the farms. It is also preparing to serve the farmers residing near the Skagit-Bellingham interurban with electricity and wires have been strung for that purpose. It is proposed to extend the service to the Skagit and La Conner flats as soon as business will justify. The company now has a hydroelectric development of 53,750 kw. and an auxiliary steam plant with a capacity of 17,400 kw.

SAN FRANCISCO, CAL.—The application of the Oro Electric Corporation to the railroad commission for leave to contract with the Pacific Gas & Electric Company for power on a basis of seven mills per unit was opposed by the Northern California Power Company. That company now has in effect two contracts with the Oro, dated respectively October 5 and December 20, 1912. By the first of these the Oro is furnished with power in Butte, Yuba, Sutter and Yolo counties at the rate of 6 mills. By the latter the Oro agrees to take all the power needed by it in California exclusively from the Northern California Power Company at an agreed rate of 5 mills per unit. Allen Chickering, on behalf of the Western States Gas & Electric Company also opposed the Oro's new contract, as his company is now under contract with the Pacific to be supplied with power at 9 mills.

BOISE, IDAHO.—The Idaho Power and Light Company has taken over the holdings of the Beaver River Power Company in Boise and Southern Idaho, together with all the franchises of the latter company and its several power plants and power lines, the value of which is estimated at close to $1,000,000. L. L. Nunn, for years actively engaged in the development of electrical power, has been the prime mover in the deal by which the Beaver River Power Company passed out of existence so far as its operation in Idaho is concerned. This will limit the operations of this company hereafter to its system in Beaver County, Utah, with headquarters at Provo, Utah. L. L. Nunn is president of the new Idaho Power and Light Company; W. L. Biersach, treasurer; E. P. Bason, general manager. Mr. Nunn issued the following statement with reference to the recent move: "A new corporation has just been organized under the laws of the State of Nevada, by the name of the Idaho Power and Light Company. Its main offices are in Boise. This company has acquired the Idaho property of the Beaver River Power Company, including the 7500 horsepower station on the Malad River, the distribution systems of Boise and other Idaho towns. The franchise of the Beaver River Power Company to do business in Boise has been conveyed with the consent of the Mayor and City Council, to this company, which assumes all contracts made with the Beaver River Power Company's customers." The Beaver River Power Company started a genuine electric power war in Southwestern Idaho, particularly in Boise, when, two years ago, it first invaded this territory, then held by the Idaho-Oregon Light and Power Company, now the Southern Idaho Light and Power Company. After a hard fight a franchise was secured by the Beaver River people to operate in this city. The Southern Idaho Company controls all of the electric city and interurban lines in this territory, having recently merged them under the control of one holding company. The deal just closed to take over the Beaver River holdings in this State means that new capital has been placed behind it by President Nunn.